

## **REMARKS**

This paper is being provided in response to the Office Action mailed April 12, 2007, in which claims 2-37 and 116-119 are pending in the application. All claims are rejected. The first deadline for responding to this Office Action was July 12, 2007. A Petition for a three (3) month extension of time up to and including October 12, 2007, is submitted herewith. Claims 3-4 and 116 have been amended. Applicant respectfully submits that the amendments to the claims do not add new subject matter. Claims 2, 5-6, 15, and 31-32 have been cancelled.

### **Brief Description of the Invention**

The present invention relates generally to microfluidic chemical systems for synthesis and coating of colloidal nanoparticles. Specifically, the present invention integrates microchemical systems to synthesize and coat colloidal nanoparticles into one integrated substrate.

### **Rejections under 35 U.S.C. § 112**

Examiner has rejected claim 15 as being indefinite. Applicant has cancelled claim 15 and therefore respectfully requests that this rejection be withdrawn.

### **Rejections under 35 U.S.C. § 102 and 103**

Claims 2 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of Yasuda (U.S. Patent No. 6,244,738).

Claims 2 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chan in view of Yasuda.

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of Yasuda, and in further view of Chandler (U.S. Patent No. 6,506,584).

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Chan in view of Yasuda and in further view of Chandler.

Claims 5-7, 9-14, 16-32 and 116-118 are rejected under 35 U.S.C. § 102(b) as being anticipated by Nikiforov (U.S. Patent No. 6,107,044).

Claims 5, 6, 31, and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang.

Claims 7-12, 14-30, 116 and 117 are rejected under 35 U.S.C. § 102(b) as being anticipated by Wang (*Chem. Commun.* 2002, pp. 1462-63).

Claims 5, 6, 31, 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Chan.

Claims 7-30, 33-37 and 116-119 are rejected under 35 U.S.C. § 102(a) as being anticipated by Chen (*Nano Letters*, 2003, Vo. 3, No. 2, pp. 199-201).

Claims 13, 33-37 and 118 and 119 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of Barbera-Guillem (U.S. Patent No. 6,179,912).

The present invention relates generally to microfluidic chemical systems for synthesis and coating of colloidal nanoparticles. Specifically, the present invention integrates into one integrated substrate, various microchemical systems to synthesize colloidal nanoparticles such as Silica, Titania, Alumina or Ceria, tune their surface properties, composition and crystallinity, and control their self-assembly. *See, e.g.*, page 2, lines 22-28 and Fig. 4. For example, as claimed in independent claim 116, the various components of the microreactor system of the present invention comprise at least one inlet channel, at least one micromixing block positioned downstream from said at least one inlet channel, an ageing section positioned downstream from said at least one micromixing block, and at least one colloidal nanoparticle, wherein all of the said components reside on one integrated substrate. *See, e.g.*, page 2, line 30-page 3, line 3. Amended claim 116 now also includes the limitations of dependent claims 2, 5-6, and 31-32 to include dimensions for the inlet channel and micromixing block channels, and to further include an ultrasonication means.

None of the cited references disclose, teach or suggest the claims as amended. Neither Wang nor Chan render the amended claims obvious, either alone, or in combination with other references. As stated above, the present invention relates generally to microfluidic chemical systems for synthesis and coating of colloidal nanoparticles. The structure and dimensions of the microfluidic system is designed to ensure that flow of reactants through the device maximizes

the devices ability to synthesize and coat of the nanoparticles. For example, the inlet channel and micromixing block channel dimensions as claimed control the appropriate amount and rate of reactant flowing through the device, to maximize the devices ability to coat (or grow an additional layer on) the nanoparticles. Neither Wang nor Chan disclose, teach or suggest coating of nanoparticles, and therefore, cannot suggest appropriate dimensions for the same. Applicant therefore submits that the present claims as amended are not anticipated or obviated by the references cited by the Examiner, and respectfully requests that these rejections be withdrawn.

Based upon the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4054. Please charge any fees associated with this filing, or apply any credits, to our Deposit Account No. 03-1721.

Respectfully submitted,

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